Abstraction of the Relational Model from a Department of Veterans Affairs DHCP Database: Bridging Theory and Working Application

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Abstract

This poster describes the methods used and working prototype that was developed from an abstraction of the relational model from the VA's hierarchical DHCP database. Overlaying the relational model on DHCP permits multiple user views of the physical data structure, enhances access to the database by providing a link to commercial (SQL based) software, and supports a conceptual managed care data model based on primary and longitudinal patient care. The goal of this work was to create a relational abstraction of the existing hierarchical database; to construct, using SQL data definition language, user views of the database which reflect the clinical conceptual view of DHCP, and to allow the user to work directly with the logical view of the data using GUI based commercial software of their choosing. The workstation is intended to serve as a platform from which a managed care information model could be implemented and evaluated.

Introduction

Several years ago, VA clinicians and administrators began rethinking patient care in terms of the managed care paradigm. This led to a realization of difficulties that would be encountered in retrieving data from the VA's legacy DHCP database. Problems centered on: existing tools for accessing data; data structure or orientation; and complexity or sheer size of the DHCP data dictionary. It was believed that the relational model of DHCP's database could be used to construct a conceptual view of DHCP data that would be more appropriate to managed care data analysis. Additionally, the relational view could be developed as an abstraction of the existing database, and could be layered on top of the legacy database. In other words, a single physical database could be viewed through either the existing DHCP FileMan data dictionary, or through a relational data dictionary with SQL based tools. SQL views, through naming and composition, could reflect the user's view of the data. Customized views could provide more meaningful names to data tables (FileMan files), perform transparent joins between FileMan files and distributed systems, optimize and conditionally constrain data elements.

Methods/Results

A three tier client server system was selected for the prototype workstation with the first tier being the existing DHCP database, the middle tier containing SQL application (KB-SQL[1]) and the third tier the client. VA DHCP software is written in M programming language. The VA data dictionary is standardized across all VA medical centers and contains information on file names, M global location of data, field names, data types, and relationships between files. By traversing the DHCP data dictionary, extracting key information and embedding it into SQL DDL statements, SQL tables corresponding to DHCP files are created. The mapped representation of DHCP files, SQL server software, and logical views reside on the middle tier of the client server system.

Twenty clinical and administrative users were interviewed to ascertain their information requirements. The information requirements were translated to data elements in the corresponding physical DHCP database and SQL views representing the users conceptual view of the database were constructed on the server system. Client software (ODBC) was used to query data from the SQL views. Target users used Microsoft Access to query data, although a number of other windows applications were tested.

249 DHCP files were mapped into 1019 SQL tables and 998 index tables. DHCP fields containing integer, text, date, coded data, multiple subfields, word-processing, and pointer data types were mapped to SQL tables. Data collected from patient questionnaires were loaded into SQL tables on the SQL server and were joined to DHCP files either directly or through SQL views. SQL views representing clinical cohorts or specific populations were queried with a number of windows software packages (MS Access, Visual Basic, Borland Delphi, MS Excel). Development and evaluation of the managed care data model has begun, and work continues in this area.

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[1]KB-SQL by KB_Systems of Herndon VA